

We Claim:

1. A balloon catheter for use in treating a condition of a vessel occurring near a bifurcation that is defined by the intersection of a main vessel with a side branch vessel, the balloon catheter comprising:

5 a shaft which comprises a proximal end, a distal end, a longitudinal passageway extending between the proximal and distal ends, and a transverse hole extending from the passageway;

a balloon head which is mounted on the shaft and which comprises an elongated balloon portion having a generally uniform outer diameter surface, 10 an intermediate portion secured to the shaft proximate the hole, a port formed in the intermediate portion in alignment with the hole, and a portal extending between the outer diameter surface and the intermediate portion;

wherein a proximal end of a first guide wire which is pre-positioned in the main vessel may be inserted into the distal end of the shaft and threaded 15 through the longitudinal passageway and out the proximal end of the shaft; and

wherein a proximal end of a second guide wire which is pre-positioned in the side branch vessel may be inserted into the portal, the port and the hole and threaded through the longitudinal passageway and out the proximal end of the shaft.

20 2. The balloon catheter of claim 1, wherein the shaft comprises an inner tube which is surrounded by an outer tube and an inflation passageway which is defined between the inner and outer tubes.

3. The balloon catheter of claim 2, wherein the balloon head comprises a proximal end which is secured and sealed to a distal end of the outer tube and a distal end which is secured and sealed to a distal end of the inner tube.

5 4. The balloon catheter of claim 2, wherein a distal end of the outer tube is sealed to a distal end of the inner tube and the balloon head comprises proximal and distal ends which are both secured and sealed to the outer tube.

10 5. The balloon catheter of claim 4, wherein the outer tube comprises at least one inflation hole which extends between the inflation passageway and the balloon head.

6. The balloon catheter of claim 1, further comprising a stent which is mounted on the balloon head.

7. The balloon catheter of claim 6, wherein the stent comprises a window which is aligned with the portal in the balloon head.

15 8. The segmented balloon catheter of claim 6, wherein the stent is a drug coated or drug eluting stent.

9. A method for treating the condition of the vessel with the balloon catheter of claim 1, the method comprising:

20 inserting a first guide wire into the main vessel and a second guide wire into the side branch vessel;
mounting a first expandable stent over the balloon head;

inserting a proximal end of the first guide wire into the distal end of the shaft and threading the first guide wire through the passageway and out the proximal end of the shaft;

5 inserting a proximal end of the second guide wire through the first stent, the portal, the port and the hole and threading the second guide wire through the passageway and out the proximal end of the shaft;

advancing the balloon head into the main vessel adjacent the bifurcation; and

10 inflating the balloon head to thereby implant the first stent in the main vessel adjacent the bifurcation.

10. The method of claim 9, further comprising:

providing a second balloon catheter having a shaft, a longitudinal passageway extending through the shaft and a balloon head mounted on the shaft;

15 mounting a second expandable stent over the balloon head of the second balloon catheter;

threading the proximal end of the second guide wire through the longitudinal passageway of the second balloon catheter;

20 advancing the balloon head of the second balloon catheter through the first stent and into the second branch vessel adjacent the bifurcation; and

inflating the balloon head of the second balloon catheter to thereby implant the second stent in the side branch vessel adjacent the bifurcation.

11. The method of claim 10, further comprising the following
preliminary steps:

providing a third balloon catheter having a shaft, a longitudinal
passageway extending through the shaft, and a balloon head mounted on the
5 shaft;

threading the proximal end of the second guide wire through the
longitudinal passageway of the third balloon catheter;

advancing the balloon head of the third balloon catheter at least
partially through a window in the first stent and into the second branch vessel;

10 and

inflating the balloon head of the third balloon catheter to thereby
align the window with the side branch vessel.

12. The method of claim 9, further comprising providing a therapeutic
substance on the first stent.

15 13. The method of claim 12, wherein the stent is a drug coated or drug
eluting stent.